REMARKS/ARGUMENTS

The Examiner is thanked for her review of the pending application and also the phone interview.

Claims 1-17, 19-27 remain in this application. Several claims have been amended to address the Examiner's Sections 101 and 112 rejections. Claims 28 to 36 have been added.

In the Office Action dated October 29, 2007, the Examiner has rejected Claims 1-4, 9-10, 15, 19-20, and 25-27 under 35 U.S.C. 101 because it does not recite subject matter within one of the statutory classes. Regarding this rejection the Examiner has stated that "Claim 1 recites a series of engines (i.e. econometric engine, financial model engine, and promotional engine). Engines are portions of programs, and thus the body of claim 1 is construed as software per se. Claims 2-4, 9-10, 15 and 19-20 depend from claim 1 and therefore have the same deficiencies. Computer programs and software are merely a set of instructions <u>capable</u> of being executed by a computer. Without specific language stating that a computer or computer processor is actively executing the computer program/software, computer programs and software are not considered to be statutory processes or machines. Therefore, there must be some functional act performed by a computer or computer element on the software/computer program to impart statutory subject matter. Therefore, it is respectfully submitted that claims 1-4, 9-10, 15, 19-20 and 25-27 are directed towards non-statutory subject matter."

Base Claim 1 has been amended and now recites a "<u>price optimization system</u> configured to create a promotional event calendar, useful in association with at least one store". Support for a price optimization system with various engines can be found on figure 1 and page 10, lines 7-19. Similarly, support for the implementation using a general purpose computer system can be found on figure 7A-7B and pages117-119.

It is well-known to one skilled in the electrical and computer arts that optimization systems are computational machines and can be implemented using specific software executing on a general purpose computer, or implemented using specialized hardware such a special purpose computation machine. In other words, Applicant's claimed invention as amended can be implemented using different combinations of hardware, software and/or firmware. Accordingly, the recited claim language of Claim 1 is intended to read on different implementations with varying proportions of hardware and software, as long as all the recited functional limitations of the various "engines" are practiced.

The Examiner has also rejected Claims 1-4, 9-10, 15, 19-20 and 25-27 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding this rejected the Examiner has stated that "Claim 1 recites in the preamble a system, while the body of the claim recites a series of engines. It is unclear how a collection of engines, which are portions of computer programs, would amount to a system. Therefore, it appears that the body of the claim does not match the limitations set forth in the preamble. Clarification is required."

Base Claim 1 and its dependent claims have been amended and Claim 1 now recites a "price optimization system" while its dependent claims now recite "system", and so their claim bodies are now consistent with each respective preamble. Accordingly, Applicants believe that Claims 1-4, 9-10, 15, and 19-20 are now all in compliance with both 35 U.S.C. 101 and 35 U.S.C. 112.

The Examiner has also rejected Claims 1-8, 10, 12, 14-17, and 19-27 under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. (US 6,029,139) in view of Walser et al (U.S. 2006/0161504) and further in view of LoPresti ("New SPSS Missing Value Analysis Option").

Applicants traverse Examiner's 35 U.S.C. 103(a) rejection in its entirety.

Support for "imputed variable generator" can be found in figure 3 and also in lines 6-20 of page 13 which states "FIG. 3 is a more detailed view of the econometric engine 104. The

econometric engine comprises an **imputed variable generator** 304 and a coefficient estimator 308. The data 120 from the stores 124 is provided to the imputed variable generator 304. The data 120 may be raw data generated from cash register data, which may be generated by scanners used at the cash registers. The present invention provides methods, media, and systems for generating a plurality of **imputed econometric variables**. Such variables **are useful in that they aid businesses in determining the effectiveness of a variety of sales strategies**. In particular, such variables can be used to gauge the effects of various pricing or sales volume strategies". (Emphasis added).

In addition, support for "imputed base price variable and promotional variable" can be found in step 1033 of figure 10, lines 1-4 of page 30, step 1903 of figure 19A, lines 15-17 of page 8, and lines 9-17 of page 53.

A detailed example of imputing base price variable can be found in figure 12A, and also on page 30, line 1 to page 32, line 9 which states:

"One **imputed econometric variable that can be determined** using the initial dataset created in accordance with the forgoing, **is an imputed base price variable** (or base price). FIG. 12A is a flowchart 1200 outlining **one embodiment for determining the imputed base price variable**. The process begins by providing the process 1200 with a "cleansed" initial dataset (Step 1201), for example, the initial dataset created as described in Steps 1011-1031 of FIG. 10. The initial dataset is examined over a defined time window (Step 1203). Defining a time window (Step 1203) includes choosing an amount of time which frames a selected data point allowing one to look forward and backward in time from the selected data point which lies at the midpoint in the time window. This is done for each data point in the dataset, with the time window being defined for each selected data point. The time frame can be user selected or computer selected. The time window includes T time periods and the time period for the selected data point. One preferred set of T time periods is eight (8) weeks. It is contemplated that time windows of greater or lesser size can be selected. Referring to a preferred example, the selected (or current) data point is centered in the time window having $T/2$ time periods before the selected data point and $T/2$ time periods

after the selected data point. In the present example, the time window includes the four weeks preceding the selected data point and the four weeks after the selected data point.

Referring to FIG. 12B, the selected data point "X" (shown as a single week) is framed by a time period of -T/2 (shown here as 4 weeks) before the data point "X" and a time period of +T/2 (shown here as 4 weeks) after the data point "X". The time window comprising all the time (i.e., -T/2, X, T/2) between points a and b.

Referring again to FIG. 12A, once the time window is defined, an "initial base price" is determined (Step 1205). This can be accomplished by the following process. With reference to FIG. 12B, two price maxima are determined (M_1, M_2), one for each of the T/2 time periods before and after the current data point. The lesser value of the two maxima (here M_1) comprises the initial base price. The actual price (in selected data point "X") is compared with this initial base price (here, M_1). If initial base price is higher than the actual price (as shown in the pictured example), then the "initial base price" is reset to reflect the price for the previous time period. In the pictured example, the lesser maxima M_1 is $1.00, the actual price during the data point "X" is less than $1.00 so the initial base price is reset to the price of the previous time period "P" (here $1.00).

Alternatively, the initial base price can be determined using other methods. For example, the average price of the product over the -T/2 time period (4 weeks) preceding the data point X may be used as the initial base price. Whatever method used, the initial base price is generated for each time period of the modeled time interval. One by one, each data point in the modeled time frame is examined and an initial base price is determined for each time period (e.g., "X") in the modeled time interval.

The initial base price values generated above provide satisfactory values for the imputed base price variable which may be output (Step 1207) and used for most purposes. However, optional Steps 1209-1217 describe an approach for generating a more refined imputed base price variable." (Emphasis added).

Similarly, a detailed example of imputing "promotional variable" can be found in on page 32 line 10- to page 32 line 6 which states:

"In generating a more refined imputed base price variable, the effect of **promotional (or discount) pricing** is addressed (Steps 1209-1217). This may be calculated by specifying a discount criteria (Step 1209); defining price steps (Step 1211); outputting an imputed base price variable and an **imputed discount variable** (Step 1213); analyzing the base price distribution (Step 1215); and outputting a refined base price variable (Step 1217).

Data records are evaluated over a series of time periods (e.g., weeks) and evaluated. The point is to identify price records which are discounted below a base price. By identifying these prices and not including them in a calculation of base price, the base price calculation will be more accurate. Therefore, a discount criterion is defined and input as a variable (Step 1209). A preferred criterion is 2%. Therefore, records having prices which are discounted 2% below the previously determined initial base price are treated as records having "promotional prices". These records are temporarily deleted from the dataset. The remaining records, having zero or small discounts, are treated as "non-promoted" records. So the price of each product for the "non-promoted" time periods (weeks) is averaged over all time periods (weeks) in the modeled time interval. The average non-promoted price is referred to as a base price." (Emphasis added).

Hence, Claim 1 is now allowable over Cunningham et al. (US 6,029,139) and Walser et al (U.S. 2006/0161504), since none of the two cited references teach this limitation, alone or in combination.

Additionally, regarding Base Claim 1, the Examiner stated that "LoPresti discloses an imputed variable generator and imputing variable values in data sets when data is missing . . . It would have been obvious to one of ordinary skill in the art at the time of the invention to input store constraints in the system of Cunningham et al. as well as explicitly include promotional variables and base price variables in the engines of Cunningham et al. in order to more efficiently select the best promotions for the store based on quantifiable inputs by the user, such as price, volume, or profit, by using constraints concerning the store that will affect minimization of cost."

LoPresti appears to disclose "imputed values for the missing data with a method chosen by the user" for resolving missing questionnaire data for Social Science studies. See page 1, and page 2, paragraph 4. Specific methods of imputation are not apparently disclosed. Nor does it appear that LoPresti suggests the extension of imputation beyond missing questionnaire data for Social Science studies.

The Supreme Court has held that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727 (2007). Moreover, *KSR* affirmed the usage of the *Graham* factors for guidance in the determination of obviousness. *Id.*

The *Graham* factors include:

1. the scope and content of the prior art;
2. the level of ordinary skill in the prior art;
3. the differences between the claimed invention and the prior art; and
4. objective evidence of nonobviousness.

Looking to the *Graham* factors, LoPresti is very limited in scope to Social Sciences, and limited in content to the mere mention of imputing missing variables. Additionally, the differences between the claimed invention and this prior art is significant.

Additionally, the highly specialized imputation of the present invention would arguably not yield a predictable result, due to the complexity of the calculations and the unpredictability error may cause in such imputations.

LoPresti appears to strictly teach about handling missing data, where as in the present invention imputed variable generation goes much farther than that suggestion. In particular, the present invention is also enabled to impute implied or hidden data (for example the base-price variable in the description), which otherwise **does not exist at all** in the dataset

As such, Applicants assert that LoPresti does not disclose "imputing base price variable and promotional variable" in the manner of Claim 1. Furthermore, applicants assert that the combination of LoPresti with Cunningham is non-obvious. For both these reasons, Applicants respectfully traverse the rejection of Claim 1.

Moreover, Cunningham appears to disclose a method of dealing with missing variables that **teaches away from** imputation as disclosed in LoPresti. See Column 11, lines 15-18 which state

"[w]hile populating the data structures **410, 420,** there may be some missing values. This problem may be handled by initializing the data structures **410** and **420** to zero." This is objective evidence of nonobviousness, in light of the *Graham* factors. Thus, Cunningham teaching away from LoPresti bolsters the Applicants assertion that the combination of cited art is improper as being non-obvious.

Hence, Claim 1 is now allowable over Cunningham et al. (US 6,029,139) and Walser et al (U.S. 2006/0161504) and LoPresti ("New SPSS Missing Value Analysis Option"), since none of the cited references teach these limitations, alone or in combination.

Moreover, regarding Base Claim 1 the Examiner states that "Cunningham et al. teaches a computerized system [including] a promotional engine . . . wherein the promotional engine **analyzes a plurality of offers**" in the manner disclosed in Claim 1 of the present invention. (Emphasis Added).

Applicants respectfully disagree. "Offers" as referred to in Claim 1 include incentive offers supplied by manufacturers to the retailers to implement specific promotional activities. Support may be found in the Specification as filed on page 127, lines 3-10, which states "[o]ffers are deals that manufacturers or wholesalers offer to retailers as a means to induce them to promote their products in their stores..."

Applicants respectfully submit that while Cunningham may address manufacturer costs, there appears to be **no evidence that Cunningham addresses any kind of offers**, let alone "analyzes a plurality of offers" in the manner disclosed in the present invention. As such Applicants respectfully traverse the rejection.

Thus, even were the combination of Cunningham, Walser and LoPresti found to be appropriate, despite Applicants protestations, the combination still does not disclose the "offers" of Claim 1. Hence, Claim 1 is now allowable over Cunningham et al. (US 6,029,139) and Walser et al (U.S. 2006/0161504) and LoPresti ("New SPSS Missing Value Analysis Option"), since none of the cited references teach these limitations, alone or in combination.

Claims 2-4 are dependent on base Claim 1 and hence are also allowable over Cunningham '139 and Walser '504 and LoPresti, and hence are also allowable for at least the same reasons discussed above for Claim 1.

In the same Office action the Examiner rejected Claim 5 stating that "Cunningham et al. discloses . . . determining conditions from at least one manufacturer [and] selecting combinations of the offer and promotion events based on the determined values to create a promotional calendar **subject to the conditions from the at least one manufacturer.**" (Emphasis added). Applicants assert that Cunningham does not disclose "conditions from at least one manufacturer" in the manner of Claim 5.

"Conditions" as disclosed are requirements imposed by the manufacturers. Support may be found on page 128, line 20 to page 129, line 7 of the Specification as filed, which states "Conditions are requirements by the manufacturer or wholesaler that a retailer must meet to obtain the allowances. . . The conditions may be a complex combination of the above conditions such as requiring scan data, a display for a single product, an ad for a plurality of products, and a price discount of all products made by the manufacturer."

Cunningham recognizes that manufacturers incur costs and accounts for these costs; however, Cunningham does not appear to contemplate the existence of such "conditions" as disclosed in the present invention. As such, Applicants respectfully traverse the rejection.

Additionally, independent Claim 5 recites "determining the value of <u>offers</u> . . .creating a sales model <u>and wherein the sales model includes an imputed base price variable and a promotional variable</u>" (emphasis added) and is also allowable for the same reasons discussed above for Claim 1. Claims 6, 7 both dependent on base Claim 5 and hence are also allowable over Cunningham '139 and Walser '504 and LoPresti for at least the same reasons independent Claims 1 and 5 are allowable.

In the same office action the Examiner also rejected Claim 6 stating "Cunningham et al. [discloses] demand groups wherein a demand group is one product or more than one product, such as segment or brand family. A segment is a product type, such as tea bags, wherein teabags of different manufacturers would be substitutes."

However, Cunningham states at Column 6, lines 28-30 that "A 'segment' is a group of products that may be promoted in the same manner." Contrary, a demand group as disclosed on page 14, lines 19-21 is defined as "a group of **highly substitutable** products." (Emphasis added). Thus, the 'segments' of Cunningham differ on their face from 'demand groups' as recited in Claim 5. As such Applicants respectfully traverse the rejection.

Similarly, base Claim 8 recites "creating a plurality of demand groups. . . determining the value of offers . . . creating a sales model for each demand group . . . and wherein the sales model for each demand group includes an imputed base price variable and a promotional variable" (emphasis added), and hence is allowable over Cunningham '139 and Walser '504 and LoPresti for at least the same reasons discussed above for Claim 1, 5 and 6.

Dependent Claims 9-17 and 19-27 are also allowable over the cited references Cunningham '139 and Walser '504 and LoPresti for at least the same reasons their respective base Claims 1, 5, 8 are allowable.

Dependent Claims 25 and 26 recite "wherein the imputed base price variable is a function of initial base prices" and "wherein the initial base prices are averages of non-promoted prices" (emphasis added), respectively. Support can be found on lines 5-8 of page 32 and on lines 5-6 of page 33. Since none of the cited references teach or suggest the respective limitations, Claims 25, 26 are both allowable over Cunningham '139 and Dulaney '269 for these additional reasons.

Independent Claim 28 has been added to recite "A computer-implemented method for creating a promotional event calendar, useful in association with at least one store, the computer-implemented method comprising: modeling sales as a function of price to create a sales model, wherein the sales model includes imputing base price variable and promotional variable; modeling costs to create a cost model; receiving cost model and sales model; analyzing a plurality of offers, a plurality of promotional events, conditions from at least one manufacturer, and constraints from the at least one store; and creating a promotional event calendar by optimally matching offers with promotional events."

Support for added Claim 28 may be found on page 124, line 6 to page 130, line 20 of the Specification as filed, which states "The promotional event calendar generating system 2100 comprises an econometric engine 2104, a financial model engine 2108, a promotional event calendar generating engine 2112, and a support tool 2116 . . . which specifies a promotional event, offer and condition combination for a time period, by computing an optimal set of promotional events, offers, and conditions that meet the rules."

Dependent Claim 29 has been added to recite "wherein creating the promotional event calendar is subject to the conditions from the at least one store, and wherein the constraints from the at least one store includes a linear constraint and a nonlinear constraint."

Support for added Claim 28 may be found on page 126, line 10-11 of the Specification as filed, which states "Promotional events may be subject to constraints, which may make the generation of a promotional event calendar more complex." See also page 128, line 20-21 of the Specification as filed, which states "Conditions are requirements by the manufacturer or wholesaler that a retailer must meet to obtain the allowances."

Dependent Claim 30 has been added to recite "wherein creating the promotional event calendar comprises: computing a score for each offer of the plurality of offers and each event of the plurality of promotional events, wherein each event include at least one type of promotional vehicle, and wherein each offer includes at least one promotional vehicle requirement; selecting a combination of offers from the plurality of offers, and events from the plurality of promotional

events to form a subset of offers and events; reconciling the type of promotional vehicle with the promotional vehicle requirements for the offers and events within the subset of offers and events; and constructing a promotion calendar utilizing the subset of offers and events, and reconciled type of promotional vehicle and promotional vehicle requirements."

Support for added Claim 30 may be found on page 131, line 3 to page 134 line 10 of the Specification as filed, which states "FIG. 24 is a flow chart of the step of generating a promotional event calendar (step 2332) in the preferred embodiment of the invention. First a valuation is performed . . . Finally in the calendar construction step 2416, the final promotion solution is constructed."

Dependent Claim 31 has been added to recite "wherein the computing the score independently computes a value of each offer and a value of each event, and wherein the computing the score also links each product with one promotional vehicle type of the at least one promotional vehicle type."

Support for added Claim 31 may be found on page 131, line 6-7 of the Specification as filed, which states "valuation step computes the value of each offer independently and the value of each event independently." Also see page 131, line 14-16 which states "This step also determines which products should be placed in each of the promotional vehicles that is part of the event."

Dependent Claim 32 has been added to recite "wherein selecting the combination of offers and events includes maximizing the sum of the values of the offers and events within the subset of offers and events, while adhering to the conditions from at least one manufacturer and the constraints from the at least one store."

Support for added Claim 32 may be found on page 133, line 3-5 of the Specification as filed, which states "In this step a combination of offers and events are selected so that the sum of the value of the selected offers and events is maximized, while meeting the set constraints."

Dependent Claim 33 has been added to recite "wherein reconciling the type of promotional vehicle with the promotional vehicle requirements includes solving an integer problem."

Support for added Claim 33 may be found on page 133, line 20 to page 134 line 3 of the Specification as filed, which states "This involves solving an integer problem to ensure that all events that each selected offer requires promotes at least one product from the offer in their ad and display vehicles."

Dependent Claim 34 has been added to recite "wherein constructing a promotion calendar includes setting the promotion levels of each product and computing the resulting profit over a promotional period."

Support for added Claim 34 may be found on page 134 line 3-7 of the Specification as filed, which state "the final promotion solution is constructed by using decisions made in the selection step 2408 and the reconciliation step 2412 to set the promotion levels of each product in each period for each promotional activity (ad display or TPR) and computing the resulting profit."

Dependent Claim 35 has been added to recite "wherein the selection includes the integer programming model with the following objective and appropriate restrictions on the variables:

$$\sum_{t=1}^{T}\sum_{o} Value_o IO_{o,t} + \sum_{t=1}^{T}\sum_{e} Value_{e,t} IE_{e,t}$$ where, t: time indices; O: a set of offers; o: an offer in O; E: a

set of events; e: an event in E; T: total planning period in weeks;

$$IE_{e,t} \equiv \begin{cases} 1 \ if \ event \ e \ is \ scheduled \ to \ start \ in \ period \ t \\ 0 \ otherwise \end{cases}$$;and $$IO_{o,t} \equiv \begin{cases} 1 \ if \ offer \ o \ is \ accepted \ in \ period \ t \\ 0 \ otherwise \end{cases}$$."

Support for added Claim 35 may be found on page 134, line 19 to page 139, line 13, and page 151, lines 9-10 of the Specification as filed.

Dependent Claim 36 has been added to recite "wherein the reconciliation includes the integer programming model with the following objective and appropriate restrictions on the variables:

$$Maximize: \sum_{t=1}^{T} \left(\sum_{\substack{p,e:IE_{e,t}=1 \\ k \in DisplayLad(e)}} Score_p IDE_{p,e,t+k} + \sum_{\substack{p,e:IE_{e,t}=1 \\ k \in AdLag(e)}} Score_p IAE_{p,e,t+k} \right)$$ where, t: time indices; E: set of

events; e: event in E; p: index for products belonging to the set of promoted products;

$$DisplayLag(e) \equiv \left\{ \begin{array}{l} the\ offsets\ from\ the\ start\ of\ the\ event\ during \\ which\ the\ products\ have\ to\ be\ on\ display \end{array} \right\} ;$$

$$AdLag(e) \equiv \left\{ \begin{array}{l} the\ offsets\ from\ the\ start\ of\ the\ event\ during \\ which\ the\ products\ have\ to\ be\ advertised. \end{array} \right\} ;\ T : \text{total planning period in}$$

$$\text{weeks};\ IE_{e,t} \equiv \left\{ \begin{array}{l} 1\ if\ event\ e\ is\ scheduled\ to\ start\ in\ period\ t \\ 0\ otherwise \end{array} \right. ;$$

$$IDE_{p,e,r} \equiv \left\{ \begin{array}{l} 1\ \text{if product } p \text{ is on display in event } e \text{ in period } r \\ 0\ \text{otherwise} \end{array} \right. ;$$

$$IAE_{p,e,r} \equiv \left\{ \begin{array}{l} 1\ \text{if product } p \text{ is advertised in event } e \text{ in time } r \\ 0\ \text{otherwise} \end{array} \right. ;\ \text{and } r: \text{ any period in the promotion}$$

interval."

Support for added Claim 36 may be found on page 134, line 19 to page 139, line 13, and page 156, lines 1-3 of the Specification as filed.

In sum, base Claims 1, 5, 8 are believed to be allowable. Dependent Claims 2-4, 6, 7, 9-17, 19-27 which depend therefrom are also believed to be allowable as being dependent from their respective patentable parent Claims 1, 5, 8 for at least the same reasons. Hence, Examiner's rejection of dependent Claims 2-4, 6, 7, 9-17, 19-27 are rendered moot in view of the allowability of independent Claims 1, 5, 8.

Applicants believe that all pending Claims 1-17, 19-36 are now allowable over the cited art and are also in allowable form and respectfully request a Notice of Allowance for this application from the Examiner. The commissioner is authorized to charge any additional fees that may be due to our Deposit Account No. 50-2766 (Order No. DEMIP006). Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at telephone number 925-570-8198.

LAW OFFICES OF KANG S. LIM PMB 436 3494 Camino Tassajara Road Danville, CA 94506 Voice: (925) 570 8198 Facsimile: (925) 736 3974	Respectfully submitted, /Kang S. Lim/ Kang S. Lim Attorney for Applicant(s) Reg. No. 37,491

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